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ABSTRACT

This workbook was designed as an easy-to-read, slower-paced text for students who have learning, reading, and language problems. As one of five workbooks to aid low achievers in problem solving, it focuses on using estimation to figure out what an answer to a mathematical problem might be. How to estimate using rounding and how to obtain a closer estimate are stressed. Questions within the text repeatedly involve the students' attention, and their learning is checked and reviewed within each lesson. Word problem situations reflect mathematical problems that students might actually meet. Worksheets to accompany the workbook are available in the teacher's guide. The five units in the workbook are entitled: What's Your Estimate?, Easy Numbers, Getting Close Estimates, Easy Fractions, and Easy Decimals, Easy Percents. A page on Estimation Reminders, with a list of things to remember and some examples, is also included. (MNS)

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ESTIMATION

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Math in Action: Word Problems

Janus Books

ESTIMATION

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Introduction

Picture this:

You work in an office. You're supposed to be at work by 9 o'clock. Today you are late!

Your boss watches you come in. She says, "You're late! That's four times you've been late in three weeks."

You say, "I estimated how much time I needed to get here. But I estimated wrong. And I missed my bus."

She says, "You'd better start estimating *right*! Or you won't have this job any more!"

When we estimate, we do this: We *quickly* figure out what an answer might be. We try to get as *close* to that actual answer as we can. If we don't get close, things can happen that we don't like! For example, we could get fired from a job for being late.

If you learn to get good estimates, you can use them to help solve real-life problems. For example: how long it takes to get to work or school; how much to pay for something; how much you will earn; how much of something you will need.

You can also estimate when you solve word problems. Good estimates help you see if your answers are right or wrong.

This book can help you learn some ways to make good estimates. You'll also learn how to use numbers that are easy to handle. Then the next time you have to get somewhere or solve a word problem, you'll be surprised how close your estimate will be!

Unit 1

What's Your Estimate?

Suppose you want to go to a movie. How much money do you think you'd need? Think of all the things you'd need to pay for. Then write *one* amount.

_____

How did you decide on that amount?

_____

_____

You probably thought of some of these things:

- How much a ticket might cost.
- How much bus fare might cost.
- How much popcorn, candy, or drinks might cost.

Then you roughly added the costs to get your answer.

What you did was *estimate* an answer. Estimating is a quick way to figure out an answer. An estimate is not an actual (or real) answer. It is an amount that is *close* to the actual answer.

When we estimate, we think of all the things—the facts—that we'd use to figure out an actual answer. If we don't, our estimate won't be close to the actual answer. And it won't be useful to us.

Now suppose you're doing this problem:

> What's the latest you can leave your house and get to your first class on time? Estimate the time.

In order to estimate the time, you'll need to think of certain facts. Those facts are about how you get to school, and what you do before your first class. What are those facts? Write them here. (One is started for you.)

How long it takes me to _____

_____

_____

Bonus: Do the problem. Estimate the latest time you can leave the house. Write that time.

_____

Draw a line that's one inch long:

Estimating Facts

When we figure out an actual answer, we use actual facts. (For example, let's say the actual cost of a shirt is $7.80. Then the actual cost of two shirts *must be* $15.60.)

But when we estimate an answer, we use estimated facts. (For example, we can say the shirt costs *about* $8.00. Then the estimated cost of two shirts is *about* $16.00.)

Have you ever had to estimate how wide something is just by looking at it? If you did, you used an estimated fact: how long you thought an inch (or foot) is.

Try estimating how many inches wide some things are. But first, make sure you have an idea of how long an inch really is. Get a ruler. Draw a line on this page that's one inch long.

Look at the line you drew. Then look at these things: (1.) your thumb, (2.) this page, (3.) the seat of your chair. Then answer the questions.

1. How many inches long is your thumb?

   Your estimate: _____

2. How many inches wide is this page?

   Your estimate: _____

3. How many inches wide is the seat of your chair?

   Your estimate: _____

Bonus: With the ruler, measure each of the three things. Write the actual measurements next to your estimation. How close did you get?

Wrong Estimate!

Picture this: You are shopping for food. You estimate how much you'll have to pay. Your estimate is **$4**. You think, "Great! I have **$5**." When it's time to pay, you find out your bill is really **$8**! What's wrong with your estimate?

Your estimate is *too far* from the right answer. If you had looked at the things you wanted to buy, you might have noticed this: Your estimate didn't make sense.

When you estimate, try to get an answer that's as *close* to the actual answer as possible. Check your estimate by asking yourself, "Does this estimate make sense?" Then think about the reasons it does.

For example, suppose you have a job interview at 11 a.m. To get there you must ride a bus. You know that the ride is about **25** minutes. About how much time should you give yourself to get there: a half hour or one hour?

Why is that a sensible estimate?

One hour is a sensible estimate. You want to make sure you have enough time for your bus ride. You also want to make sure you have enough time in case something happens, such as getting lost!

When we make a wrong estimate, we sometimes feel bad. Things happen that we don't like. Think of a time when you (or someone you know) made a wrong estimate. What happened? How did you (or the person) feel?

Estimation Workout

One way to get good at estimating is this: *practice*. Estimate whenever you can. Then *check* your answers. The more you practice, the better you'll become. Here are some exercises to practice with.

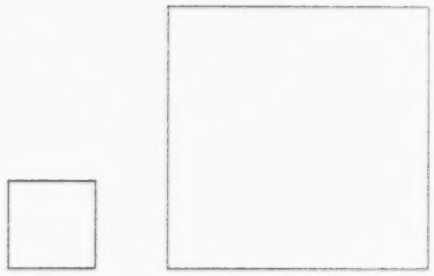
1. Look at the color lines at right. Estimate how many inches long each line is. Write your estimates. Then get a ruler and measure the lines. Write the actual measurements.

	Your Estimate	**Actual Measurement**
a.	_____	_____
b.	_____	_____

a. _____

b. _____

2. Look at the big box at right. And look closely at the small box next to it. Estimate the number of small boxes you'd need to fill the big box. (Hint: Draw small boxes in the big box.) Write your estimate below. Then check yourself. The right answer is upside down.



_____

3. How much time will it take you to get home from school today? Write the estimated time you'll leave and get home. Then, later, write the actual times.

Leave School

Estimated time: _____ Actual time: _____

Get Home

Estimated time: _____ Actual time: _____

Answer: 9 small boxes make up the big box.

Unit 2

Easy Numbers

Picture this:

You're at a grocery store. You estimate how much these things cost altogether: a loaf of bread for **$1.20** and a gallon of milk for **$2.00**. What facts do you use to estimate with?

_____

Right! You use the prices of those things. You use *numbers*.

But sometimes certain numbers are hard for us. For example, odd numbers are hard for some people to add, subtract, multiply, or divide. (Odd numbers are numbers such as **9** or **7**.) And sometimes certain operations, such as multiplying and dividing, give them trouble.

What kinds of numbers are hard for you to quickly figure with?

_____

_____

What math operations are hard for you to do quickly?

_____

_____

When we estimate, we change hard numbers to easy numbers. Those are numbers that we can easily add, subtract, multiply, or divide.

Many people have a hard time figuring quickly. But every person has numbers that he or she can easily figure with. Some people can easily figure with numbers that end in zero, such as **20**. Or they can easily figure with numbers that end in five, such as **25**. This unit will help you find out which kinds of numbers are easy for you.

Easy Evens

Even numbers are easier to figure with than odd numbers. What are some examples of even numbers?

_____

Numbers such as 2, 4, 6, 8, 10 are *even* numbers. You can divide 2 into each number evenly. That means you can divide each number exactly in half, and nothing is left over. For example, divide 2 into 4. What's the answer?

$$2\overline{)4}$$

Right. The answer is 2. 2 is exactly half of 4. And nothing is left over.

Now, look at these numbers. Which are even numbers? Draw a circle around them. (Remember: Even numbers can be divided in half.)

60 61 62 63 64 65 66 67 68 69 70

Practice using even numbers. Do these problems. Go as fast as you can. Then check yourself. (The answers are upside down.)

1. a. $\begin{array}{r} 2 \\ +6 \\ \hline \end{array}$ b. $\begin{array}{r} 20 \\ +12 \\ \hline \end{array}$

2. a. $\begin{array}{r} 8 \\ -6 \\ \hline \end{array}$ b. $\begin{array}{r} 16 \\ -\ 4 \\ \hline \end{array}$

3. a. $\begin{array}{r} 8 \\ \times 4 \\ \hline \end{array}$ b. $\begin{array}{r} 10 \\ \times\ 6 \\ \hline \end{array}$

4. a. $6\overline{)12}$ b. $4\overline{)96}$

Which operations seem easiest for you to do?

_____ add _____ subtract _____ multiply _____ divide

Bonus: Brush up on your math facts. Practice counting by 2's forward *and* backward. Do the same with the other even numbers.

Answers: 1. a. 8 b. 32 2. a. 2 b. 12 3. a. 32 b. 60 4. a. 2 b. 24

Easy Fives

Numbers that can be divided by 5 can also be easier to figure with. You probably know how to count by 5's. Fill in the numbers that are missing.

5 10 15 ___ 25 ___ 35 40 ___ 50 ___ 60 ___ 70 ___ ___ ___ ___ ___ 100

Notice this? When you count by 5's, you add 5 to each number. Now count *backward*. Subtract 5 from each number.

55 50 45 ___ 35 ___ 25 ___ 15 ___ ___

Practice using easy fives. Do these problems. Go as quickly as you can. Then check your answers.

1. a.
$$\begin{array}{r} 25 \\ +\ 5 \\ \hline \end{array}$$

b.
$$\begin{array}{r} 15 \\ +20 \\ \hline \end{array}$$

2. a.
$$\begin{array}{r} 35 \\ -15 \\ \hline \end{array}$$

b.
$$\begin{array}{r} 175 \\ -100 \\ \hline \end{array}$$

3. a.
$$\begin{array}{r} 5 \\ \times 5 \\ \hline \end{array}$$

b.
$$\begin{array}{r} 20 \\ \times\ 5 \\ \hline \end{array}$$

4. a. $5\overline{)55}$

b. $5\overline{)105}$

Which operations seem easiest for you to do?

_____ add _____ subtract _____ multiply _____ divide

Bonus: Brush up on your math facts. Practice counting by 5's forward and backward.

Answers: 1. a. 30 b. 35 2. a. 20 b. 75 3. a. 25 b. 100 4. a. 11 b. 21

Easy Tens

Numbers that can be divided by 10 can be easier to figure with. You can see that for yourself. Do these problems. Then check your answers.

1. Which is easier to add?

   a. $\begin{array}{r} 29 \\ +18 \\ \hline \end{array}$ *or* b. $\begin{array}{r} 30 \\ +20 \\ \hline \end{array}$

2. Which is easier to subtract?

   a. $\begin{array}{r} 22 \\ -\ 9 \\ \hline \end{array}$ *or* b. $\begin{array}{r} 22 \\ -10 \\ \hline \end{array}$

3. Which is easier to multiply?

   a. $\begin{array}{r} 19 \\ \times\ 3 \\ \hline \end{array}$ *or* b. $\begin{array}{r} 20 \\ \times\ 3 \\ \hline \end{array}$

4. Which is easier to divide?

   a. $9\overline{)19}$ *or* b. $10\overline{)20}$

In all the examples, the second problem is easier to do. And the answers you get are close to the right answers. Practice using easy tens. Quickly do these problems. Go as fast as you can.

5. a. $\begin{array}{r} 20 \\ +480 \\ \hline \end{array}$ b. $\begin{array}{r} 7{,}230 \\ +1{,}000 \\ \hline \end{array}$

6. a. $\begin{array}{r} 160 \\ -\ 80 \\ \hline \end{array}$ b. $\begin{array}{r} 1{,}240 \\ -1{,}020 \\ \hline \end{array}$

7. a. $\begin{array}{r} 220 \\ \times\ 30 \\ \hline \end{array}$ b. $\begin{array}{r} 250 \\ \times\ 10 \\ \hline \end{array}$

8. a. $70\overline{)140}$ b. $30\overline{)90}$

Which operations are easy for you to do?

_____ add _____ subtract _____ multiply _____ divide

Bonus: Brush up on your math facts. Practice counting by 10's forward to 100 and backward to 10. Then practice counting by 100's forward to 1,000 and backward to 100.

Answers: 1. a. 47 b. 50 2. a. 13 b. 12 3. a. 57 b. 60 4. a. $21\frac{6}{9}$ b. 2
5. a. 500 b. 8,230 6. a. 80 b. 220 7. a. 6,600 b. 2,500 8. a. 2 b. 3

Estimation Workout

You'll be able to figure with easy numbers quickly if you practice using them. Look at the times tables. The dark numbers are easy numbers. Make math problems for each group of easy numbers. Try to use all the easy numbers. Then do the problems.

1. Easy Evens

add: **subtract:** **multiply:** **divide:**

2. Easy Fives

add: **subtract:** **multiply:** **divide:**

3. Easy Tens

add: **subtract:** **multiply:** **divide:**

Bonus: Change workbooks with a partner. Correct each other's problems.

Unit 3

Getting Close Estimates

When we estimate, we change hard numbers to numbers we can easily figure with. Changing a number to another number is called *rounding the number*.

But we must be careful which numbers we round to. If we round to numbers that are too small, our estimate may be too small. And if we round to numbers that are too large, our estimate may be too large.

Suppose you are rounding the number **18**. You will change it to an easy ten—a number that can be divided by **10**. You can round it to **10** or **20** or **30**. Which would you round it to? Why?

_____

If you round to **10**, your estimate may be too small. If you round to **30**, your estimate may be too large. **20** is the best number because it is *nearest* **18**.

Look at the number line at the bottom of the page. **10** is how many numbers away from **18**? (Count the numbers from **10** to **18**.)

_____

30 is how many numbers away from **18**?

_____

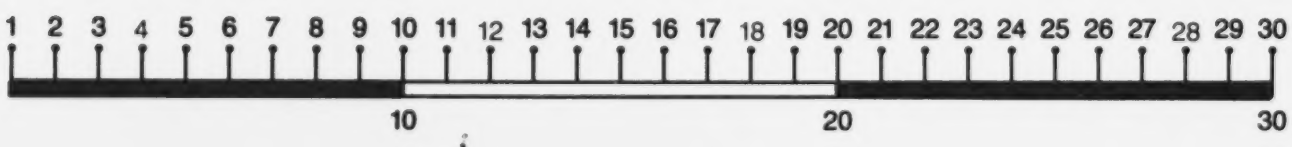
20 is how many numbers away from **18**?

_____

10 is *eight* numbers away from **18**. **30** is *twelve* numbers away from **18**. And **20** is just *two* numbers away from **18**. So, **20** is the easy ten that's nearest **18**.

Look at the number line again. Which easy ten is nearest to these numbers?

1. 12 _____
2. 28 _____
3. 4 _____



Rounding to Even Numbers

Look at the number line below. Find **17**. (17 is an odd number.) Put an **X** above it.

Now suppose you are rounding **17** to the nearest *even number*. Which number would you round **17** to?

_____

If you say **16**, you're right. If you say **18**, you're also right.

When you round a number to an even number, you can round it *up*. (For example: **17** to **18**.) Or you can round it *down*. (For example: **17** to **16**.)

Which number should you round to: The next number up or the next number down? It depends on *you*. Round to the even number you can best handle.

Practice rounding odd numbers to even numbers. Read this word problem. Circle the odd numbers.

> Jennifer buys some dishes for **$7**. She buys a lamp for **$23** and a picture for **$2**. How much does she spend in all?

Did you circle **7** and **23**? Round both numbers *up* to even numbers.

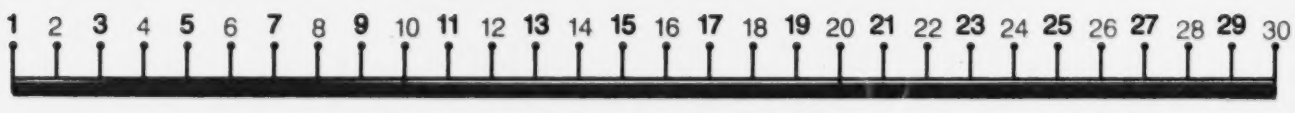
7 → _____ **23** → _____

Now round both numbers *down* to even numbers.

_____ ← **7** _____ ← **23**

Now round these odd numbers to even numbers. First round *down*. Then round *up*.

	Round Down		**Round Up**
1.	_____	**3**	_____
2.	_____	**9**	_____
3.	_____	**17**	_____
4.	_____	**25**	_____
5.	_____	**109**	_____



Rounding to Easy Fives

Suppose you're rounding numbers to *easy fives*. Would you round up? Or down? Find out. Read this word problem and circle the numbers.

> Ruth travels 12 miles one day. She travels 13 miles the next day. How many miles does she travel in all?

Did you circle 12 and 13? Notice that the two numbers are close to each other. What two easy fives could you round both numbers to?

Right. You could round both numbers down to 10. You could also round them up to 15.

Now look at the number line. Find **12** and **13** on it. Put an **X** above each number.

Look at 12 on the number line. What easy five is nearest—10 or 15? Why?

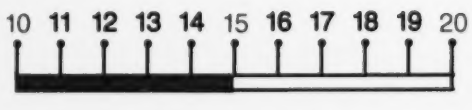
Yes. 12 is nearest **10.** 12 is *three* numbers away from 15 and *two* numbers away from 10. So, you'd round 12 down to 10.

Now look at 13 on the number line. What easy five is it nearest? Why?

Right! 13 is nearest **15**. 13 is *three* numbers away from 10, and *two* numbers away from 15. So, you'd round 13 up to 15.

When you round numbers to the nearest easy number, you will get an answer that's close to the actual answer. (Sometimes you'll even get the *right* answer.) For example, look at the two problems at right. The first problem shows the actual numbers from the word problem. The second problem shows the easy fives nearest those numbers. Do the estimation.

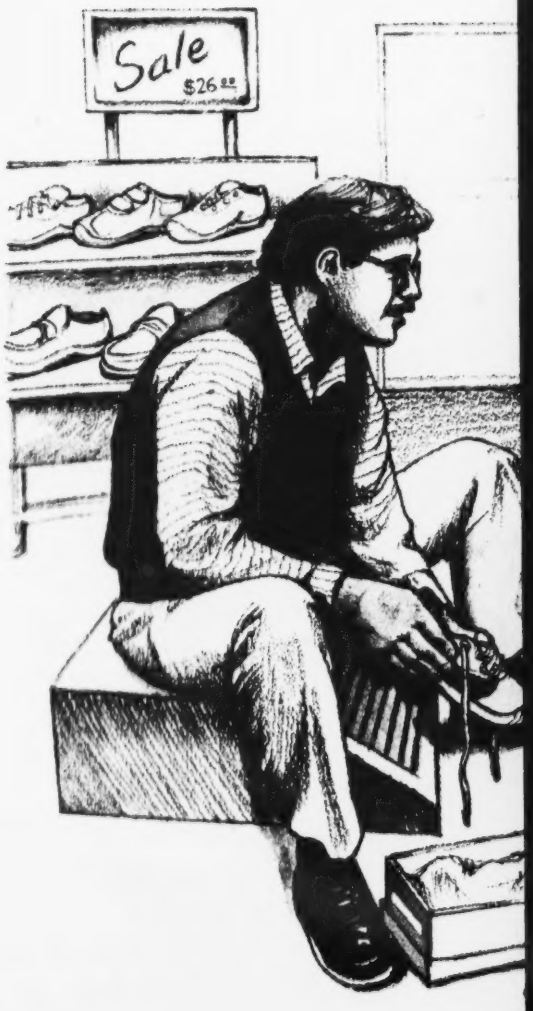
How close is your estimate to the actual answer?



1. 2.

12 →	10
+13 →	+15
25	-----
actual answer	estimate

Rounding to Easy Tens



Suppose you are estimating an answer to this problem: **23 + 28**. You will round those numbers to *easy tens*. Both numbers are between **20** and **30**. But **23** is nearer **20**. And **28** is nearer **30**. Why is that so? (Hint: Look at the number line.)

Right! **23** is *three* numbers away from **20** (but *seven* numbers away from **30**). And **28** is *two* numbers away from **30** (but *eight* numbers away from **20**).

Now do the estimation:

23	→	20
+28	→	+30
51 actual answer		..... estimate

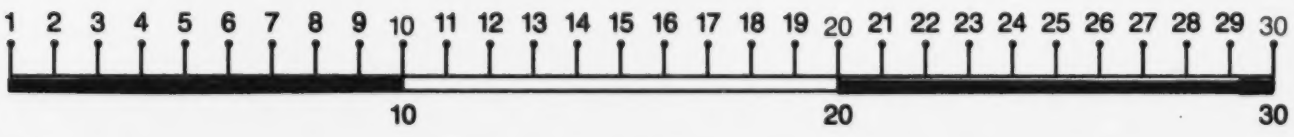
How close is your estimate to the actual answer?

Your estimate should be very close. It should be just one number away from the actual answer.

Now look at the problems below. The problem at left shows actual numbers. The three problems next to it show the easy tens those numbers could be rounded to. Which problem do you think will give you the closest estimate? Put an **X** next to that problem. Then do the estimations. Find out if you are right.

	1.	2.	3.
14	→ 10	→ 20	→ 10
+18	→ +10	→ +20	→ +20
32 actual answer	..... estimate	..... estimate	..... estimate

Look at the problem you chose. How close is that estimate to the actual answer?



Which Easy Numbers?

You've learned to round numbers to the nearest *even number*, *easy five*, or *easy ten*. Which kind of easy number should you choose? It depends on you. Choose the easy number you can work best with.

Suppose you are working on this word problem. You want to get an estimate of the actual answer. Read the problem and circle the numbers.

> A pair of shoes usually costs **$33**.
> When it is on sale, it costs **$26**.
> How much do you save when you buy it on sale?

Which math operation would you do to get the answer: add, subtract, multiply, or divide?

Right! You'd subtract.

Now look at each number. Round it to a number that's easy for you. Write that easy number below, next to the actual number.

Actual Number		**Easy Number**
$ 33	→	___
− 26	→	−___
$.....	actual answer	..... estimate

Now do the problem that will give you an estimate of the answer. When you finish, see what the actual answer is. (The actual answer is upside down.) How close is your estimate to the actual answer?

Actual Answer: ⅄$

Estimation Workout

Practice changing these numbers to easy numbers.

1. Change these to the nearest easy evens (numbers that can be divided by 2). Round up and down. (One is done.)

	Down		Up		Down		Up		Down		Up
a.	2	3	4	b.		25		c.		127	
		7				63				283	
		9				99				695	

2. Change these to the nearest easy fives (numbers that can be divided by 5). Round up and down.

	Down		Up		Down		Up		Down		Up
a.		4		b.		23		c.		124	
		9				64				463	
		3				79				929	

3. Change these to the nearest easy tens (numbers that can be divided by 10). Round up *or* down, not both.

	Down		Up		Down		Up		Down		Up
a.		9		b.		142		c.		1,289	
		11				367				2,469	
		59				829				6,924	

Bonus: In the space below, write some math problems with numbers that are hard for you. Then write the problems again, but change the hard numbers to easy numbers. Do the problems with the easy numbers.

Unit 4

Easy Fractions

Sometimes problems ask you to find a *fraction* of a whole number. Here is an example: $\frac{2}{3}$ of 18 = ? You can estimate answers to those kinds of problems. You do it by using *easy fractions*. Easy fractions are $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{3}{4}$.

Let's see why $\frac{1}{2}$ is easy to figure with. Look at this word problem. Circle the numbers.

> The auto shop class has 12 students. $\frac{1}{2}$ of them are girls. How many girls are in auto shop?

The problem asks you to find $\frac{1}{2}$ of 12 students. Whenever you find $\frac{1}{2}$ of an amount, you do this: *divide the amount by* 2. What is 12 divided by 2?

$$2\overline{)12}$$

Right! 12 divided by 2 is **6**. So, $\frac{1}{2}$ of 12 is 6.

Now read this word problem. Circle the numbers.

> Mariko and Matt buy a present. The present costs $9. They each pay $\frac{1}{2}$ of it. Estimate how much each pays.

To do the problem you'd find $\frac{1}{2}$ of $9. But $9 is an odd number. It can't be divided evenly by 2. What should you do?

Right! Round $9 up to $10. Or round $9 down to $8. Then divide by 2.

In the problem below, write one of those even numbers. Then find the estimate. Check your answer.

$$2\overline{)\quad}$$

The actual answer is $4.50. How close is your estimate?

Bonus: Practice dividing different numbers by $\frac{1}{2}$.
First make a list of even numbers.
Then divide the numbers by 2.
Go as fast as you can.

Estimating with $\frac{1}{4}$

Get four things that are alike. (For example, four pencils.) The four things add to *one amount*. Each thing is one of four things. So each thing is $\frac{1}{4}$ *of one amount.*

Now take away *two* of the things. Look at the two things that are left. What fraction of the amount are they?

Right! Two things are $\frac{1}{2}$ *of* 4.

Take away one of those two things. You are now dividing the $\frac{1}{2}$ in half. How many things do you have left?

Right! You have one thing left. What fraction is that one thing of four things?

That's right! It's $\frac{1}{4}$. So $\frac{1}{2}$ *of* $\frac{1}{2}$ *is* $\frac{1}{4}$.

When you must figure $\frac{1}{4}$ of an amount, do this: First, *find* $\frac{1}{2}$ *of the amount.* Then, *find* $\frac{1}{2}$ *of the answer.*

Try it. Find $\frac{1}{4}$ of **$8**. First, find $\frac{1}{2}$ of **$8**. What's the answer?

$$2\overline{)\$8}$$

Right. The answer is **$4**.

Next, find $\frac{1}{2}$ of **$4**. What's the answer?

$$2\overline{)\$4}$$

Right. The answer is **$2**. That's $\frac{1}{2}$ of **$4**. It's also $\frac{1}{4}$ of **$8**.

Suppose you want to estimate $\frac{1}{4}$ of **$33**. **$33** is an odd number. What must you do?

Yes: Round **$33** to a nearest even number. Now follow these steps and do the estimation.

1. Round to the nearest even number. Write it below.

   $33 ⟶ _____

2. Write the even number in the problem below. Find $\frac{1}{2}$ of it.

$$2\overline{)\ \ }$$

3. If your answer is an odd number, round it to the nearest even number. Write it below. Now find $\frac{1}{2}$ of that number.

$$2\overline{)\ \ }$$

Check your estimate. (The estimate is upside down.)

Estimate: 6$ ot 8$

Estimating with $\frac{3}{4}$

You learned this about fractions. If you have four things:

- all four things are one amount;
- one thing is $\frac{1}{4}$ of the amount;
- two things are $\frac{1}{2}$ of the amount.

Look at the picture of the pencils. Draw a circle around three pencils. Three things are *what fraction* of the amount?

Right! Three of four things are $\frac{3}{4}$ *of the amount.*

$\frac{3}{4}$ is made up of two other fractions. What are they? (Look at the picture again. Think of what fraction *one* thing is. Think of what fraction *two* things are.)

$\frac{3}{4}$ is made up of $\frac{1}{2}$ *and* $\frac{1}{4}$.

When you want to find $\frac{3}{4}$ of an amount, do this:

1. First, *find* $\frac{1}{2}$ *of the amount.* (Divide it by 2.) Write the answer down so you won't forget it.
2. Next, *find* $\frac{1}{2}$ *of the answer.* (Divide it by 2.) Remember: $\frac{1}{2}$ of $\frac{1}{2}$ is $\frac{1}{4}$. The answer you now get will be $\frac{1}{4}$ *of the amount.*
3. Then, *add the two answers.* You now have $\frac{3}{4}$ of the amount. Why is that so?

Right! You're adding $\frac{1}{2}$ of the amount and $\frac{1}{4}$ of the amount. $\frac{1}{2}+\frac{1}{4}=\frac{3}{4}$.

Let's see how that works. Suppose you are finding $\frac{3}{4}$ of 12. Do this:

1. Find $\frac{1}{2}$ of 12.

$$2\overline{)12}$$

2. Find $\frac{1}{4}$ of 12. To do that, write the answer you got above in the problem below. Then divide by 2.

$$2\overline{)\quad}$$

3. Now look at the answer you got in *step 1.* (That's $\frac{1}{2}$ of 12.) Then look at the answer you got in *step 2.* (That's $\frac{1}{4}$ of 12.) Write those numbers in the problem below. Then add them.

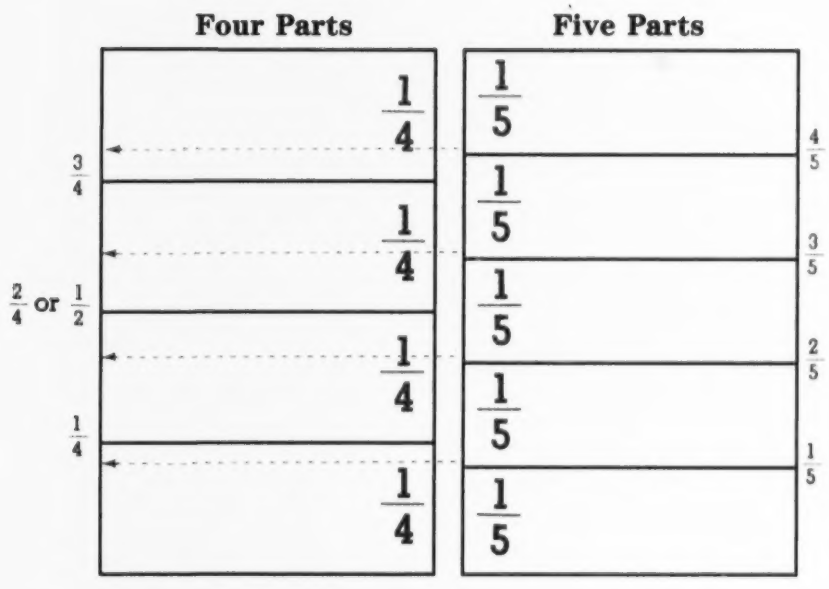
_____ is $\frac{1}{2}$ of 12

\+ _____ is $\frac{1}{4}$ of 12

_____ is $\frac{3}{4}$ of 12

Check your answer. The right answer is upside down.

Answer: The answer is 9.



Rounding to Easy Fractions

Suppose you were estimating the answer to this problem: $\frac{2}{5}$ of 8 = ?

$\frac{2}{5}$ can be a hard fraction to figure with. What can you do to make it easier?

Right! You can round $\frac{2}{5}$ to an easy fraction.

But which easy fraction should you round it to: $\frac{1}{4}$, $\frac{1}{2}$, or $\frac{3}{4}$? You learned to round hard numbers to the *nearest* easy number. You do the same with hard fractions. Round them to the easy fraction that is most like or *close* to them.

Look at the picture on this page. It shows two boxes. One box is divided into four parts. One part is $\frac{1}{4}$. Two parts are $\frac{1}{2}$. And three parts are $\frac{3}{4}$.

Now look at the other box. That box is divided into five parts. One part is $\frac{1}{5}$. Two parts are $\frac{2}{5}$. What are three parts?

Yes: Three parts are $\frac{3}{5}$. And four parts are $\frac{4}{5}$.

With your pencil, shade the parts that make up $\frac{2}{5}$ of that box. What fraction is $\frac{2}{5}$ close to: $\frac{1}{4}$? $\frac{1}{2}$? Or $\frac{3}{4}$?

If you say $\frac{1}{4}$, you are right. But if you say $\frac{1}{2}$, you are also right. When you estimate, you can round fractions up or down.

Look at the fractions below. Round them to a close easy fraction. If you can, round up and down.

	Round Down		Round Up
1.	_____	$\frac{1}{5}$	_____
2.	_____	$\frac{2}{5}$	_____
3.	_____	$\frac{3}{5}$	_____
4.	_____	$\frac{4}{5}$	_____

More or Less

Let's estimate the answer to the problem: $\frac{2}{5}$ of 8 = ? What two easy fractions can you round $\frac{2}{5}$ to? (Hint: Look at the other page.)

Right! You can round $\frac{2}{5}$ *up* to $\frac{1}{2}$. (That's a bigger fraction.) Or you can round it *down* to $\frac{1}{4}$. (That's a smaller fraction.)

Round $\frac{2}{5}$ up to $\frac{1}{2}$. Do the estimate.

$\frac{2}{5}$ of 8 = ?

$\frac{2}{5} \longrightarrow \frac{1}{2}$ $\quad 2\overline{)8}$

Did you get **4**? 4 is close to the actual answer. But it's also *more*. (That means the actual answer is *less* than 4.) How do we know that? (Look at the boxes on page 22.)

Right! $\frac{1}{2}$ is larger than $\frac{2}{5}$. So your estimate will be more than the actual answer.

When you round fractions *up*, your estimate will be *more* than the actual answer. What happens when you round *down*?

Right! When you round fractions *down*, your estimate will be *less* than the actual answer.

Now do this: Round $\frac{2}{5}$ down to $\frac{1}{4}$ and find $\frac{1}{4}$ of 8. (Remember: 4 is $\frac{1}{2}$ of 8.)

$\frac{2}{5}$ of 8 = ?

$\frac{2}{5} \longrightarrow \frac{1}{4}$ $\quad 2\overline{)\overset{4}{8}}$ $\quad 2\overline{)4}$

Did you get **2**? 2 is close to the actual answer, but less than it. (That means the actual answer is *more* than 2.)

Here's how you can get a very close estimate. You know that the actual answer is *less* than 4 and *more* than 2. What number might it be?

Bonus: Estimate the answers to these problems. Use the space above.

1. $\frac{4}{5}$ of 8 = ?
2. $\frac{1}{3}$ of 12 = ?
3. $\frac{7}{8}$ of 16 = ?

Rounding to Whole Numbers

Suppose you're estimating the answer to this problem: $2\frac{1}{3} + 1\frac{4}{5} = ?$ You know you can round fractions to easy fractions. So you do this:

$2\frac{1}{3} \longrightarrow 2\frac{1}{2}$

$1\frac{4}{5} \longrightarrow +1\frac{3}{4}$

answer

Is that easier for you to add?

Sometimes it's hard to add fractions or mixed numbers. (A mixed number is a whole number and a fraction.) Here's how to handle them: *Round one fraction to the next whole number.*

Suppose we round one of the fractions in your problem. Is it easier to add? Try it.

$2\frac{1}{3} \longrightarrow 2\frac{1}{3}$

$1\frac{4}{5} \longrightarrow +2$

..... answer

Did you get $4\frac{1}{3}$? That's close to the actual answer—$4\frac{2}{15}$. And it was easier to do.

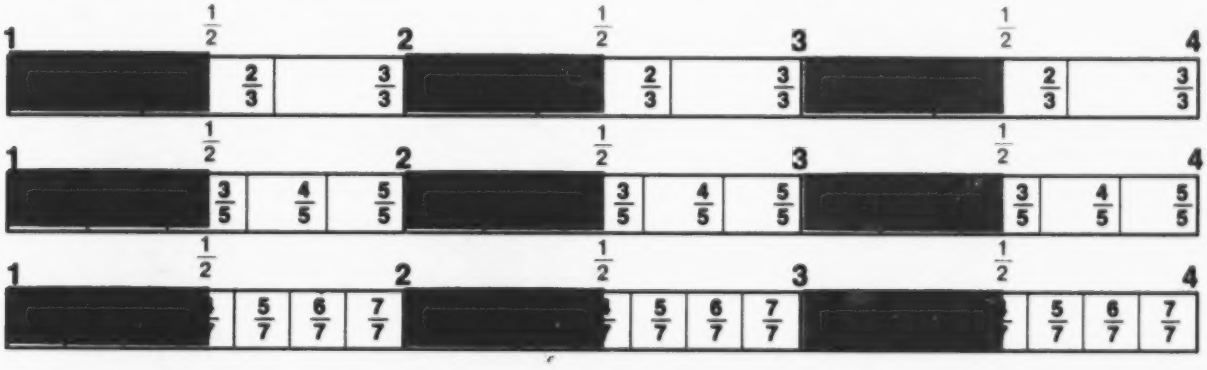
When you round fractions to whole numbers you can round them *up* to the next whole number. (For example: $1\frac{4}{5} \longrightarrow 2$.) Or you can round them *down* to the next whole number. (For example: $2\frac{1}{3} \longrightarrow 2$.) How do you know which to round to?

Right! Round to the whole number that's *nearest* the fraction.

Now look at these mixed numbers. Round the fractions to the nearest whole numbers. Here's a hint: If the fraction is smaller than $\frac{1}{2}$ of a number, round *down*. If the fraction is close to $\frac{1}{2}$ or if it is larger, round *up*. (Remember: You can only round up or down, not both.) To help you, look at the chart. Find the number and fraction on that chart.

	Round Down		Round Up
1.	_____	$1\frac{1}{3}$	_____
2.	_____	$1\frac{2}{3}$	_____
3.	_____	$2\frac{4}{5}$	_____
4.	_____	$2\frac{1}{5}$	_____
5.	_____	$3\frac{1}{7}$	_____
6.	_____	$3\frac{6}{7}$	_____

Whole Numbers and Fractions



Estimation Workout

Read this word problem. Then estimate the answer.

> Masa needs $12\frac{1}{2}$ more credits to graduate. He already has $\frac{3}{5}$ of that amount. How many credits does he have?

1. You must find $\frac{3}{5}$ of $12\frac{1}{2}$.
   a. First, round $\frac{3}{5}$ to the nearest easy fraction.

      $\frac{3}{5} \rightarrow$ _____

   b. Next, round $12\frac{1}{2}$ down to the nearest *even* whole number.

      $12\frac{1}{2} \rightarrow$ _____

2. Will your answer be more or less than the actual answer. Why?

   _____

3. Now figure the estimate. Use the space below.

How close are you to the actual answer? Find out. The right answer is upside down.

Answer: Masa has $7\frac{1}{2}$ credits. If your estimate is 9 or 6, that's close. If it's 8 or 7, that's very close!

Unit 5

Easy Decimals, Easy Percents

You buy some food for $1.68. You give the cashier a dollar bill. You also give her three quarters. How much do you give her in all?

Right! You give her $1.75. In other words: You give her a whole amount (100 cents) and .75 of that amount (75 cents).

Whenever you figure with money, you are figuring with *decimals*. Decimals show parts of amounts. What else show parts of amounts? (Think of the last unit.)

Yes! Fractions also show parts of amounts.

Every fraction can be written as a decimal. (For example, $\frac{1}{3}$ is the same as .33.) You know that certain fractions are easier to figure with. Certain decimals are also easier to figure with. Those easy decimals are the same as easy fractions.

.25 is the same as $\frac{1}{4}$
.50 or .5 is the same as $\frac{1}{2}$
.75 is the same as $\frac{3}{4}$

Now look at these problems. Change the fractions into easy decimals. (One is started for you.)

1. $\frac{1}{4} \rightarrow .25$
   $+\frac{1}{4} \rightarrow +.__$
   $\frac{1}{2} \quad .__$

2. $\frac{1}{4} \rightarrow .__$
   $+\frac{1}{2} \rightarrow +.__$
   $\frac{3}{4} \quad .__$

3. $\frac{1}{4} \rightarrow .__$
   $+\frac{3}{4} \rightarrow +.__$
   $1 \quad .__$

4. $\frac{1}{2} \rightarrow .__$
   $+\frac{1}{2} \rightarrow +.__$
   $1 \quad .__$

5. $\frac{1}{2} \rightarrow .__$
   $+\frac{3}{4} \rightarrow +.__$
   $1\frac{1}{4} \quad .__$

6. $\frac{3}{4} \rightarrow .__$
   $+\frac{3}{4} \rightarrow +.__$
   $1\frac{1}{2} \quad .__$

Bonus: Find the answers to the decimal problems.

Using Easy Decimals

Suppose you are doing this problem: .50 of 28 = ? .50 is the same as what fraction?

_____

Right! .50 is the same as $\frac{1}{2}$.

To find $\frac{1}{2}$ of 28, you'd divide by 2. What's the answer?

$$2\overline{)28}$$

Did you get 14?

Now **find .25 of 28**. (Remember: .25 is the same as $\frac{1}{4}$. And $\frac{1}{4}$ is the same as $\frac{1}{2}$ of $\frac{1}{2}$.) Write the numbers below and find the answer.

Did you get 7?

Now **find .75 of 28**. .75 is the same as what fraction?

_____

Right! .75 is the same as $\frac{3}{4}$. (Remember: $\frac{3}{4}$ is the same as $\frac{1}{2} + \frac{1}{4}$.)
What math operation would you do to find .75 of 28?

_____

Right again! You'd add .50 ($\frac{1}{2}$) and .25 ($\frac{1}{4}$) of 28.

Write the numbers below and add.

..... is .50 (or $\frac{1}{2}$) of 28

\+ ..... is .25 (or $\frac{1}{4}$) of 28

..... is .75 (or $\frac{3}{4}$) of 28

Did you get 21?

Now find the answer to this problem: .75 of $6.00 = ?

1. First, find .50 ($\frac{1}{2}$) of $6.00.

   $.

2. Next, find .25 ($\frac{1}{4}$) of $6.00.

   $.

3. Then, find .75 ($\frac{3}{4}$) of $6.00.

   $. is .50 ($\frac{1}{2}$) of $6.00

   \+ . is .25 ($\frac{1}{4}$) of $6.00

   $. is .75 ($\frac{3}{4}$) of $6.00

Answers: 1. $3.00 2. $1.50 3. $4.50

Easy Percents

A store is having a sale. You see this sign: *Prices 25% off!* What does that mean?

Right! Prices are **25%** *less* than the usual price. To figure out the new price, you'd do this:

1. Find **25%** of the usual price.
2. Subtract your answer from the usual price.

Percents are another way to show parts of amounts. A percent can mean the same as a decimal. What else is it the same as?

Right! A percent is the same as a fraction.

You learned to use easy decimals and easy fractions when you estimate. You can also estimate with *easy percents.*

Easy Fractions		Easy Decimals		Easy Percents
$\frac{1}{4}$	=	.25	=	25%
$\frac{1}{2}$	=	.50	=	50%
$\frac{3}{4}$	=	.75	=	75%

Easy percents mean the same as easy decimals and fractions. What are they? Write them below. (Look at the chart on this page.)

$\frac{1}{4}$ = .25 = _____

$\frac{1}{2}$ = .50 = _____

$\frac{3}{4}$ = .75 = _____

Now suppose you want to buy a watch that's on sale for **25%** less. The regular price is **$28**. How much is the sale price? To find out do this:

1. First, find **25%** of **$28**. (Remember: **25%** is the same as $\frac{1}{4}$.)

   $2\overline{)\$28}$ is 50% (or $\frac{1}{2}$) of $28

   $2\overline{)\quad}$ is 25% (or $\frac{1}{4}$) of $28

2. Next, subtract your answer from the regular price.

   $28 regular price

   − _____ 25% of regular price

   $ sale price

Check your answer.

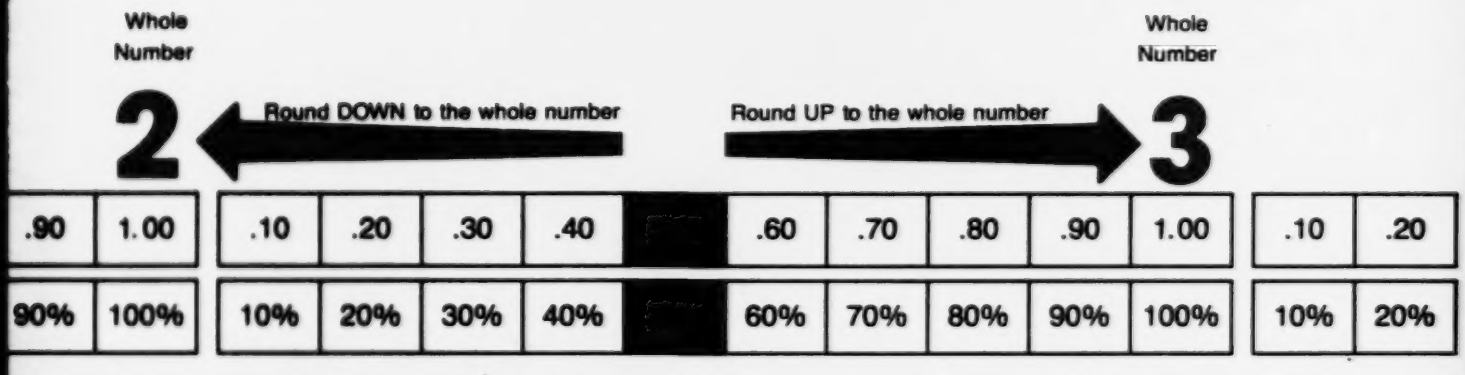
Bonus: Suppose you had to pay **25%** *more* than **$28**. Estimate what the price would be. (Hint: You'd *add* to find the answer.)

Answer: So the sale price is $21 ($28 − $7 = $21).
25% of $28 is $7.

Rounding Decimals and Percents

When you estimate with decimals and percents, you can round them in all the ways you've learned.

		Round Down		Round Up
1. You can round to the nearest even numbers. Round these decimals and percents up and down.	a.	_____	.67	_____
	b.	_____	3.33	_____
	c.	_____	37%	_____
	d.	_____	3%	_____
2. You can round to the nearest easy five. Round these decimals and percents up *or* down.	a.	_____	.6	_____
	b.	_____	.14	_____
	c.	_____	13%	_____
	d.	_____	4%	_____
3. You can round to the nearest easy ten. Round these decimals and percents up *or* down. (If a number is halfway between two easy tens, round up and down.)	a.	_____	.4	_____
	b.	_____	.35	_____
	c.	_____	28%	_____
	d.	_____	5%	_____
4. You can round to the nearest easy decimal or easy percent. Round these decimals and percents to the nearest easy decimals and percents.	a.	_____	.24	_____
	b.	_____	.62	_____
	c.	_____	77%	_____
	d.	_____	48%	_____
5. You can round to the nearest whole number. Round these decimals and percents. Round up *or* down, not both. Use the chart.	a.	_____	2.1	_____
	b.	_____	2.90	_____
	c.	_____	89%	_____
	d.	_____	10%	_____



Estimation Workout

Estimate the answers to these problems. Then see how close your estimates are to the actual answers.

1. Lia buys 7 yards of material. Each yard costs $.79. How much does Lia pay altogether? (You'd multiply to find the answer.)

   7 ⟶ _____

   $.79 ⟶ _____

2. Jessie works 2.7 hours today. She will work 3.9 hours tomorrow. How many hours will she work altogether? (You'd add to find the answer.)

   2.7 ⟶ _____

   3.9 ⟶ _____

3. Kobi buys a chair for 23% off. The regular price is $88. How much does Kobi pay? (Use easy percents to find the answer. To remind yourself of what to do, look at page 28.)

   23% ⟶ _____

Actual Answers: 1. $5.53 2. 6.6 hours 3. $67.76

Estimation Reminders

Here are some things to remember when you estimate:

- Make sure your estimate makes sense.
- Round to the *nearest* easy numbers. Your estimate will be closer to the actual answer.
- If you round *up*, your estimate may be more than the actual answer. And the actual answer may be less than your estimate.
- If you round *down*, your estimate may be less than the actual answer. And the actual answer may be more than your estimate.
- Easy fractions, easy decimals, and easy percents all mean the same.

$\frac{1}{4} = .25 = 25\%$
$\frac{1}{2} = .50$ or $.5 = 50\%$
$\frac{3}{4} = .75 = 75\%$

$\frac{1}{4} + \frac{1}{4} = \frac{1}{2}$
$.25 + .25 = .50$
$25\% + 25\% = 50\%$

$\frac{1}{4} + \frac{1}{2} = \frac{3}{4}$
$.25 + .50 = .75$
$25\% + 50\% = 75\%$

$\frac{1}{4} + \frac{3}{4} = 1$ (a whole amount)
$.25 + .75 = 1$
$25\% + 75\% = 100\%$ or 1

$\frac{1}{2} + \frac{1}{2} = 1$
$.50 + .50 = 1$
$50\% + 50\% = 100\%$ or 1

$\frac{1}{2} + \frac{3}{4} = 1\frac{1}{4}$
$.50 + .75 = 1.25$
$50\% + 75\% = 125\%$ or $1\frac{1}{4}$

$\frac{3}{4} + \frac{3}{4} = 1\frac{1}{2}$
$.75 + .75 = 1.50$
$75\% + 75\% = 150\%$ or $1\frac{1}{2}$

Congratulations!

You now know some ways to estimate. You know how to round numbers. And you can estimate with:

• whole numbers • fractions • decimals • percents

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